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BRUSCA, JOHN S				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/849,491

Applicant(s)

BHARADWAJ ET AL.

Examiner

John S. Brusca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-16 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-4 and 6-16 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 19 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

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DETAILED ACTION

1. This Office action contains a new grounds of rejection under 35 U.S.C. 101 and 103(a) not necessitated by amendment and is consequently a non-final Office action.

Drawings

2. The drawings were received on 19 May 2004. These drawings are accepted.

Status of the Claims

3. Claims 1-4, 6-16 are pending.

Claims 1-4 and 6-16 are rejected.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-4, and 6-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 3, 4, 6-11, 15, and 16 are drawn to a process of encoding information into polynucleotides. Claims 1, 2, and 12-14 are drawn to polynucleotides encoding information or software that encodes information in polynucleotides. A statutory process must include a step of a physical transformation, or produce a useful, concrete, and tangible result (*State Street Bank & Trust Co. v. Signature Financial Group Inc.*, CAFC 47 USPQ2d 1596 (1998), *AT&T Corp. v. Excel Communications Inc.* (CAFC 50 USPQ2d 1447 (1999))). The instant claims do not

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explicitly result in a physical transformation, thus the Examiner must determine if the instant claims include a useful, concrete, and tangible result.

As noted in *State Street Bank & Trust Co. v. Signature Financial Group Inc.* CAFC 47 USPQ2d 1596 (1998) below, the statutory category of the claimed subject matter is not relevant to a determination of whether the claimed subject matter produces a useful, concrete, and tangible result:

The question of whether a claim encompasses statutory subject matter should not focus on *which* of the four categories of subject matter a claim is directed to -- process, machine, manufacture, or composition of matter--but rather on the essential characteristics of the subject matter, in particular, its practical utility. Section 101 specifies that statutory subject matter must also satisfy the other "conditions and requirements" of Title 35, including novelty, nonobviousness, and adequacy of disclosure and notice. *See In re Warmerdam*, 33 F.3d 1354, 1359, 31 USPQ2d 1754, 1757-58 (Fed. Cir. 1994). For purpose of our analysis, as noted above, claim 1 is directed to a machine programmed with the Hub and Spoke software and admittedly produces a "useful, concrete, and tangible result." *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557. This renders it statutory subject matter, even if the useful result is expressed in numbers, such as price, profit, percentage, cost, or loss.

In determining if the claimed subject matter produces a useful, concrete, and tangible result, the Examiner must determine each standard individually. For a claim to be "useful" the claim must produce a result that is specific and substantial. For a claim to be "concrete" the process must have a result that is reproducible. For a claim to be "tangible" the process must produce a real world result. Furthermore, the claim must be limited only to statutory embodiments.

Claims 1-4 and 6-16 do not require production of a tangible result in a form that is useful to the user of the process or apparatus. The claims do not explicitly produce, or cause to be

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produced, an output in a form that can be interpreted by a user. A tangible result requires that the claim must set forth a practical application to produce a real-world result. This rejection could be overcome by amendment of the claims to recite that a result of the process is outputted to a display, or to a user, or in a graphical format, or in a user readable format, or by including a result that is a physical transformation. The applicants are cautioned against introduction of new matter in an amendment.

5. Claims 12 and 13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The program of both claims 12 and 13 have an embodiment that comprises a program per se which is not patentable subject matter. The claimed subject matter is not limited to functional descriptive material because it is not limited to a physical embodiment of a machine such as a physical computer readable memory.

In addition, claim 13 is not limited to patentable subject matter because it is not limited to **computer executable** instructions, but could merely be suggestions or advice on how to perform a method.

6. Claims 3, 4, 6-11, 15, and 16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 3, 4, 6-11, 15, and 16 are drawn to a process that includes embodiments that are entirely mental steps. The United States Court of Appeals for the Federal Circuit ruled in *In Re Stephen W. Comiskey* (84 USPQ2d 1670 (Fed. Cir. 2007)) that claimed subject matter drawn to

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mental steps were not eligible subject matter under 35 U.S.C. 101, and provided basis for the ruling as follows:

The Supreme Court has reviewed process patents reciting algorithms or abstract concepts in claims directed to industrial processes. In that context, the Supreme Court has held that a claim reciting an algorithm or abstract idea can state statutory subject matter only if, as employed in the process, it is embodied in, operates on, transforms, or otherwise involves another class of statutory subject matter, i.e., a machine, manufacture, or composition of matter. 35 U.S.C. §101. As the PTO notes, “[t]he Supreme Court has recognized only two instances in which such a method may qualify as a section 101 process: when the process ‘either [1] was tied to a particular apparatus or [2] operated to change materials to a ‘different state or thing.’” See PTO Supp. Br. 4 (quoting *Flook*, 437 U.S. at 588 n.9). In *Diehr*, the Supreme Court confirmed that a process claim reciting an algorithm could state statutory subject matter if it: (1) is tied to a machine or (2) creates or involves a composition of matter or manufacture.¹² 450 U.S. at 184. There, in the context of a process claim for curing rubber that recited an algorithm, the Court concluded that “[t]ransformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.” *Id.* (quoting *Benson*, 409 U.S. at 70);¹³ see also *In re Schrader*, 22 F.3d 290, 295 [30 USPQ2d 1455] (Fed. Cir. 1994) (holding when a claim does not invoke a machine, “§101 requires some kind of transformation or reduction of subject matter”). Thus, a claim that involves both a mental process and one of the other categories of statutory subject matter (i.e., a machine, manufacture, or composition) may be patentable under §101. See *Diehr*, 450 U.S. at 184 (holding a process that involved calculations using the “Arrhenius equation” patentable because the claim “involve[d] the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing”). For example, we have found processes involving mathematical algorithms used in computer technology patentable because they claimed practical applications and were tied to specific machines.¹⁴

¹² Of course, process claims not limited to claiming an abstract concept or algorithm (i.e., a mental process) may not be subject to the same requirements.

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¹³ See also *Diehr*, 450 U.S. at 184 (“*Industrial processes ... are the types which have historically been eligible to receive the protection of our patent laws.*” (emphasis added)); *Tilghman v. Proctor*, 102 U.S. 707, 722 (1880) (“A *manufacturing process* is clearly an art, within the meaning of the law.” (emphasis added)); *Cochrane v. Deener*, 94 U.S. 780, 788 (1876) (“A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.”).

¹⁴ See AT&T, 172 F.3d at 1355, 1358 (holding patentable “a process that uses the Boolean principle in order to determine the value of the PIC indicator” and that “require[d] the use of switches and computers”); *State Street Bank*, 149 F.3d at 1373 (“[W]e hold that the transformation of data ... by a *machine* through a series of mathematical calculations into a final share price, constitutes a *practical application* of a mathematical algorithm.” (emphases added)); *Alappat*, 33 F.3d at 1544 (“This is not a disembodied mathematical concept which may be characterized as an ‘abstract idea,’ but rather a specific *machine* to produce a *useful*, concrete, and tangible *result*.” (emphases added)); *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1058-59 [22 USPQ2d 1033] (Fed. Cir. 1992) (holding patentable a method for analyzing electrocardiograph signals for the detection of a specific heart condition that used “electronic equipment programmed to perform mathematical computation”). However, mental processes—or processes of human thinking—standing alone are not patentable even if they have practical application. The Supreme Court has stated that “[p]henomena of nature, though just discovered, *mental processes*, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.” *Benson*, 409 U.S. at 67 (emphasis added). In *Flook* the patentee argued that his claims did not seek to patent an abstract idea (an algorithm) because they were limited to a practical application of that idea—updating “alarm limits” for catalytic chemical conversion of hydrocarbons. 437 U.S. at 586, 589-90. The Court rejected the notion that mere recitation of a practical application of an abstract idea makes it patentable, concluding that “[a] competent draftsman could attach some form of post-solution activity to almost any mathematical formula.” *Id.* at 590. Since all other features of the process were well-known, including “the use of computers for ‘automatic monitoring-alarming,’” the Court construed the application as “simply provid[ing] a new and presumably better method for calculating alarm limit values.” *Id.* at 594-95. The Court held the application unpatentable because

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“if a claim [as a whole] is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.” 437 U.S. at 595 (quoting *In re Richman*, 563 F.2d 1026, 1030 [195 USPQ 340] (CCPA 1977)).

Following the lead of the Supreme Court, this court and our predecessor court have refused to find processes patentable when they merely claimed a mental process standing alone and untied to another category of statutory subject matter even when a practical application was claimed. In *Schrader* we held unpatentable a “method constitut[ing] a novel way of conducting auctions” by allowing competitive bidding on a plurality of related items. 22 F.3d at 291. In doing so, we rejected the patentee’s argument that the process used a machine. Two of the alleged machines—a “display” in the front of the auction room and “a closed-circuit television system” for bidders in different cities—were not claimed by the patent, and the third—a “record” in which bids could be entered—could be “a piece of paper or a chalkboard.” *Id.* at 293-94. We therefore concluded that the patent impermissibly claimed unpatentable subject matter. Similarly, in *In re Warmerdam*, 33 F.3d 1354 [31 USPQ2d 1754] (Fed. Cir. 1994), we held unpatentable a process for controlling objects so as to avoid collisions because the key steps of “locating a medial axis” and “creating a bubble hierarchy” described “nothing more than the manipulation of basic mathematical constructs, the paradigmatic ‘abstract idea.’” *Id.* at 1360. A machine was not required, *id.* at 1358, nor was there any indication that the process operated on a manufacture or composition of matter.

Decisions of our predecessor court are in accord. *In re Meyer*, 688 F.2d 789, 796 [215 USPQ 193] (CCPA 1982), held that “a mental process that a neurologist should follow” was not patentable because it was “not limited to any otherwise statutory process, machine, manufacture, or composition of matter.” *Id.* at 795. Similarly, *In re Maucorps*, 609 F.2d 481 [203 USPQ 812] (CCPA 1979), held that an invention “[u]ltimately ... directed toward optimizing the organization of sales representatives in a business” was unpatentable. *Id.* at 482, 486. *See also Alappat*, 33 F.3d at 1541 (“*Maucorps* dealt with a business method for deciding how salesmen should best handle respective customers and *Meyer* involved a ‘system’ for aiding a neurologist in diagnosing patients. Clearly, neither of the alleged ‘inventions’ in those cases falls within any §101 category.”).¹⁵

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¹⁵ In *Musgrave*, our predecessor court concluded that the claims at issue in that case included non-mental steps and claimed patentable subject matter. 431 F.2d at 893. To the extent that language in the opinion might suggest that mental processes standing alone are patentable, the broad language in the opinion was significantly cabined by *Benson*. See 1 *Chisum on Patents* §1.03[6][c].

[2] It is thus clear that the present statute does not allow patents to be issued on particular business systems—such as a particular type of arbitration—that depend entirely on the use of mental processes. In other words, the patent statute does not allow patents on particular systems that depend for their operation on human intelligence alone, a field of endeavor that both the framers and Congress intended to be beyond the reach of patentable subject matter. Thus, it is established that the application of human intelligence to the solution of practical problems is not in and of itself patentable

To qualify as a statutory process, the claims should positively recite the other statutory class (the thing or product) to which it is tied, for example by identifying the apparatus that accomplishes the method steps, or positively recite the subject matter that is being transformed, for example by identifying the material that is being changed to a different state or thing. Nominal data gathering or post solution activity steps in the claimed subject matter will not be considered sufficient to convert a process that otherwise recites only mental steps into statutory subject matter. Preamble limitations that require the claimed process to comprise machine implemented steps will not be considered sufficient to convert a process that otherwise recites only mental steps into statutory subject matter. The applicants are cautioned against introduction of new matter in an amendment.

7. Applicant's arguments that were filed 28 July 2008 regarding the rejections maintained from the Office action mailed 24 January 2008 have been fully considered but they are not persuasive. The applicants state that the claimed subject matter requires a physical

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transformation, however a physical transformation such as synthesis of a polynucleotide is not explicitly required in the final step of process claims 3, 4, 6-11, 15, and 16. The amendment filed 28 July 2008 also does not serve to limit the software of claims 12 and 13 as both being computer executable and existing on computer readable media, and therefore the software claims remain rejected under 35 U.S.C. 101.

Claim Rejections - 35 USC § 112

8. The rejection of claims 7-9, 11, 12, and 14-16 under 35 U.S.C. 112, second paragraph as indefinite for recitation of the term “cell” because it is not clear if the cell is a biological entity or a mathematical concept in the Office action mailed 24 January 2008 is withdrawn in view of the amendment filed 28 July 2008.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-4, and 6-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-4 and 6-16 are indefinite because it is not clear if the computing device and program of claims 1, 2, and 12-14 comprise a polynucleotide or consist solely of an electronic computer or instructions for performing a method on an electronic computer, nor is it clear if the process of claims 3, 4, 6-11, 15, and 16 is performed by making or modifying a polynucleotide or by manipulation of abstract data.

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11. Applicant's arguments filed 28 July 2008 have been fully considered but they are not persuasive because the claimed subject matter does not explicitly state whether the computing device is a polynucleotide or a computer.

Claim Rejections - 35 USC § 103

12. For the purpose of examination claims 1, 2, 13, and 14 are interpreted to include embodiments that are polynucleotides of any possible sequence.

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 1-4, 6, 10, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Butland.

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The claim is drawn to either a process of encoding numbers in a polynucleotide sequence, or polynucleotides that encode a number. In some embodiments the claimed subject matter requires bases of DNA to be assigned numerical values based on the type of base and the position of the base that represent a number encoded in the DNA base sequence. The bases are assigned values of A = 0, T = 1, C = 2, and G = 3. The position of the base contains information regarding the content of the encoded number. In some embodiments the encoded number is a positive or negative number. In some embodiments a positive number is signified by a T and a negative number is signified by a C. In some embodiments the claimed subject matter comprises software to encode the number into a polynucleotide sequence.

Regarding claims 1, 2, and 14, any polynucleotide sequence would encode a number according to an arbitrary encoding scheme, such as shown in Butland and the claimed subject matter is not limited to a particular encoded number. Therefore the polynucleotides shown in Butland could meet all of the limitations of the products claimed in claims 1, 2, and 14.

Butland shows in page 4, paragraph 31 and Table 2, a method of designing a DNA sequence to encrypt a number by use of a quaternary code. Table 2 shows a correspondence of arbitrary sequences and the numerals 0-9. The sequences of bases in table 2 correspond to numbers 1-9 and therefore the positions of the bases in the base sequence contains information. Butland also shows Table 2 the use of A as signifying a space and provides guidance to encode words or phrases or numbers in paragraph 31, and to use polynucleotides of at least 100 bases in length in paragraph 32. Table 2 shows single bases are assigned code values of A = space, T = C, C = A, and G = B. Butland does not show in Table 2 assigning values to the bases of A = 0, T =

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1, C = 2, and G = 3, or encoding positive and negative numbers, or software for encoding numbers.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the values of the single bases A, T, C, and G to be A = 0, T = 1, C = 2, and G = 3 because the choice of corresponding alphanumeric values for base sequences in Table 2 is arbitrary and could be modified without affecting the ability of a desired number to be encoded in DNA. It would have been further obvious to encode positive and negative numbers by adapting the code of Table 2 to allow for encoding the sign of a number to extend the type of numbers that could be encoded.

16. Claims 1, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Butland as applied to claims 1-4, 6, 10, and 14 above, and further in view of Finley.

The claim is drawn to polynucleotides that encode a number, further comprising software that encodes the number into a polynucleotide sequence. The position of the base contains information regarding the content of the encoded number.

Butland as applied to claims 1-4, 6, 10, and 14 above does not show software that encodes a number into a polynucleotide sequence.

Finley shows in column 2, lines 9-21 a program and computer that encrypts data. Finley shows in column 4, lines 1-4 that such a system is useful for storing information.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the encryption method of Butland by use of a computer program

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to encrypt the data because Finley shows computer programs that encrypt data are useful to store data and it is obvious to automate a manual activity (see MPEP 2144.04).

17. Applicant's arguments filed 28 July 2008 have been fully considered but they are not persuasive. The applicants state that the code of Butland does not comprise positional information, however table 2 makes clear that the sequence of bases determines what is encoded and therefore the position of each base in each sequence shown in table 2 has positional information. Table 2 indicates a coded sequence for a space which makes obvious encoding separate numbers of more than one digit, and as noted above Butland provides guidance to encode numbers, words, and phrases.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John S. Brusca whose telephone number is 571 272-0714. The examiner can normally be reached on M-F 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie A. Moran can be reached on 571-272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John S. Brusca/

Primary Examiner

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jsb